THE WEATHER AND CIRCULATION OF OCTOBER 1950[1]

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The most prominent features of the upper level circulation in the North American region during October 1950 were the deep trough in the eastern Pacific, the ridge in the central United States, and the fast, flat westerly flow across the northern United States and southern Canada (fig. 1 and Charts IX–XI). Heights at 700 mb. were considerably below normal in the trough off the west coast, with the greatest negative departures from normal centered on the east side of the trough (fig. 1). Negative height anomalies extended eastward from this center into southwestern Canada and the northwestern United States so that the ridge in Saskatchewan, Alberta, and North Dakota was weaker than normal. Over most of the remainder of the United States heights were above normal with a ridge of positive height anomaly stretching east-northeastward from Arizona to New England. Other circulation features of interest were the abnormally deep trough in the Gulf of Mexico, which was mainly a wave in the easterlies, and the trough off the east coast, which was weaker-than-normal southwest of Newfoundland.

[1] See Charts I-XI, following p. 195, for analyzed climatological data for the month.

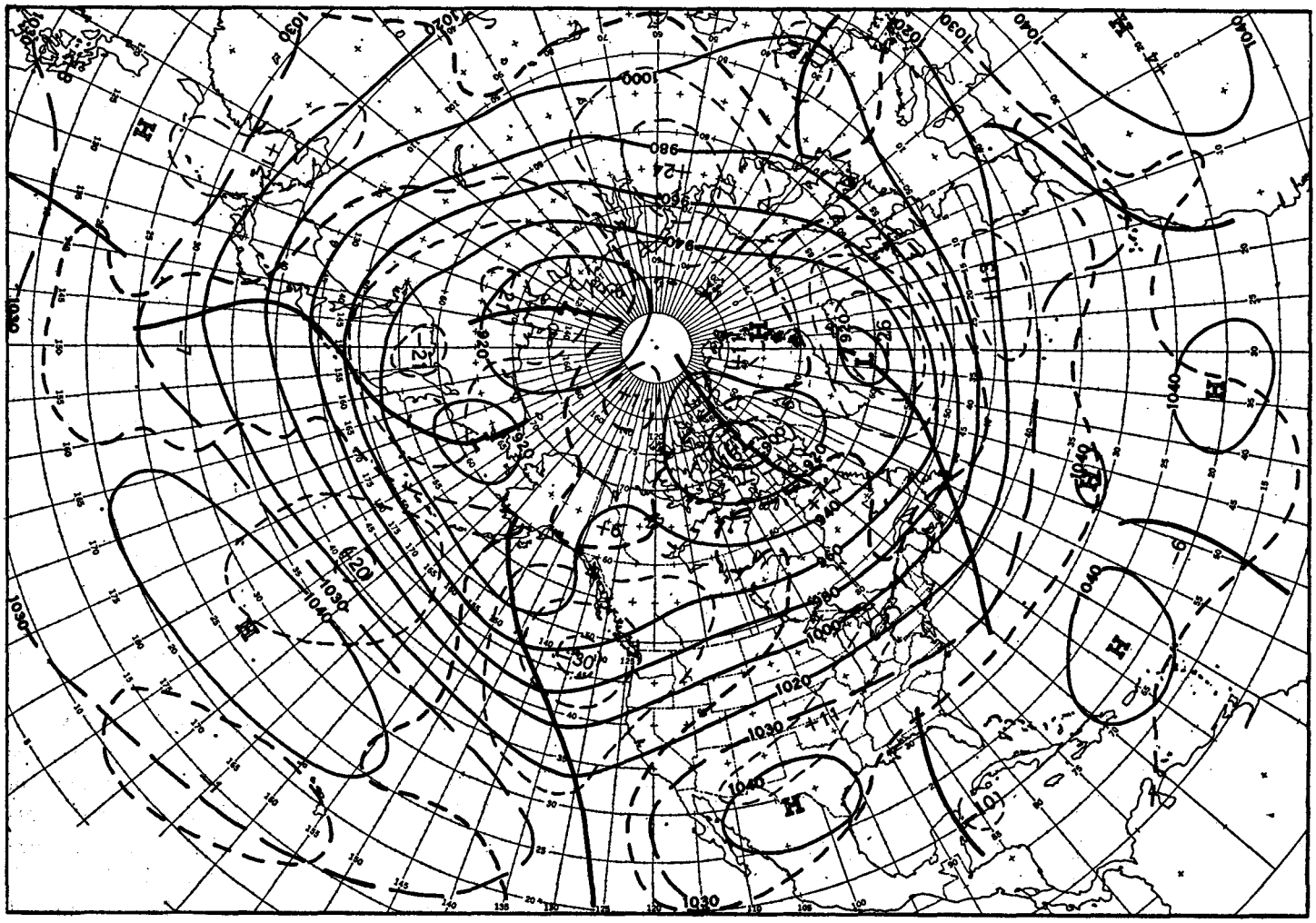


FIGURE 1.—Mean 700-mb. chart for the 30-day period September 30–October 29, 1950. Contours at 200-foot intervals are shown by solid lines, 700-mb. height departures from normal at 100-foot intervals by dashed lines with the zero isopleth heavier. Anomaly centers and contours are labeled in tens of feet. Minimum latitude trough locations are shown by heavy solid lines.

The presence of a well-defined trough off the west coast and fast westerlies across northern sections of the United States allowed most of the country to be flooded with mild Pacific air during the month. Southwesterly flow relative to normal throughout the West and along the northern border from the Pacific to the Lakes (fig. 1) also is indicative of the predominance of flow from lower and middle latitudes of the Pacific. These conditions minimized both the frequency and intensity of outbreaks of cold Canadian polar air into the United States. Chart II shows that most of the anticyclones during the month followed a nearly west to east path across the United States and Canada. Thus, most Canadian Highs never crossed into the United States and most Highs in the United States were of Pacific origin. (Most of the Highs whose tracks in Chart II appear to originate just to the east of the Continental Divide actually developed from surges of Pacific air which came across the mountains.)

With these considerations in mind, it is not surprising that surface temperatures in nearly all of the United States during October 1950 were above normal (Chart I). The greatest departures were in the Southwest just to the west of the ridge aloft where 700-mb. heights were above normal and the flow was more southwesterly than normal. In fact, it was the warmest October on record at many stations in Arizona, New Mexico, Nevada, Utah, and Colorado. A tongue of maximum positive temperature anomaly also extended northeastward toward Michigan and Ohio generally following the ridge of positive 700-mb. height anomaly shown in figure 1. Temperatures in the East were not quite so far above normal because this area was located to the rear of the weak trough off the east coast where the flow was weak northerly relative to normal. Also, temperatures were only slightly above normal along the Gulf coast from Louisiana to Florida where negative 700-mb. height anomalies, easterly 700-mb. flow relative to normal, and cyclonic curvature aloft accompanied the deep trough in the Gulf of Mexico. However, the presence of maritime tropical air in the circulation of this trough prevented the temperatures from falling below the October normals. Only in the Pacific Northwest was there any significant area of the United States where temperatures averaged below normal. This cool weather was associated with pronounced below-normal 700-mb. heights in that region and with effects of strong cyclonic activity which occurred for the most part just offshore. (See Chart III.)

Storminess in most of the United States was at a minimum in October 1950 as the great bulk of cyclones traveled eastward across southern and central Canada under the westerly belt aloft (Chart III). Thus over most of the United States, where warm anticyclonic conditions prevailed, precipitation amounts were generally lighter than normal (Chart V and inset). Driest conditions were observed in the Southwest where many stations in Arizona, New Mexico, Utah, and Texas reported the smallest amounts on record for October (0 to .01 in.). There were a few localized areas of heavier-than-normal precipitation in northern Minnesota, eastern Nebraska and Kansas, and the Lower Lakes region. This rainfall is difficult to explain from the monthly mean maps since most of it occurred as locally heavy precipitation accompanying the few cyclones that traversed the northern United States during the month (Chart III). Similarly the heavy amounts near El Paso and in southeastern New Mexico fell in thundershowers connected with a cold front early in the month.

Precipitation was also heavy in sections of the South Atlantic and Gulf States in connection with the deep easterly trough in the Gulf of Mexico (fig. 1). Two tropical storms, which entered Florida in the third week of the month (Chart III), were associated with this trough. The entire east coast of Florida bore the brunt of this tropical rainfall with amounts for the month between 10 and 15 inches.

The most widespread area of above-normal precipitation amounts was located along the Pacific Coast. This heavy rainfall was associated with the deep trough off the coast and stronger-than-normal southwesterly flow of moist Pacific air (fig. 1). As previously mentioned, a great amount of cyclonic activity was located in the region of the trough just off the west coast (Chart III). During the last week of the month two of these storms were especially severe. They lashed the area with violent winds causing extensive damage, and made a major contribution to the excessive precipitation amounts observed during the month. One of these cyclones was so deep that it established new low pressure records for several stations in Washington, Oregon, and California. (See article by Smith in this issue of the MONTHLY WEATHER REVIEW for further discussion of these storms and a tabulation of the new low pressure records.)

The generally warm, dry weather of October 1950 contrasted sharply with the rather persistent cool, wet weather of the three previous months in most central, eastern, and northern sections of the United States (cf. Charts I of July–October MONTHLY WEATHER REVIEWS). This change was associated with certain marked changes in the 700-mb. circulation pattern (cf. figs. 1 of articles by Klein in July and August MONTHLY WEATHER REVIEWS and by Winston in September MONTHLY WEATHER REVIEW). The most important changes from the three preceding months to October were the development of above-normal heights and anticyclonic conditions across most of the central and southern United States, the change from below-normal to above-normal heights in the trough near the east coast, and the replacement of above-normal heights by below-normal heights in the ridge in western Canada and the northwestern United States.

Chart I. Departure (°F.) of the Mean Temperature from the Normal, and Wind Roses for Selected Stations, October 1950

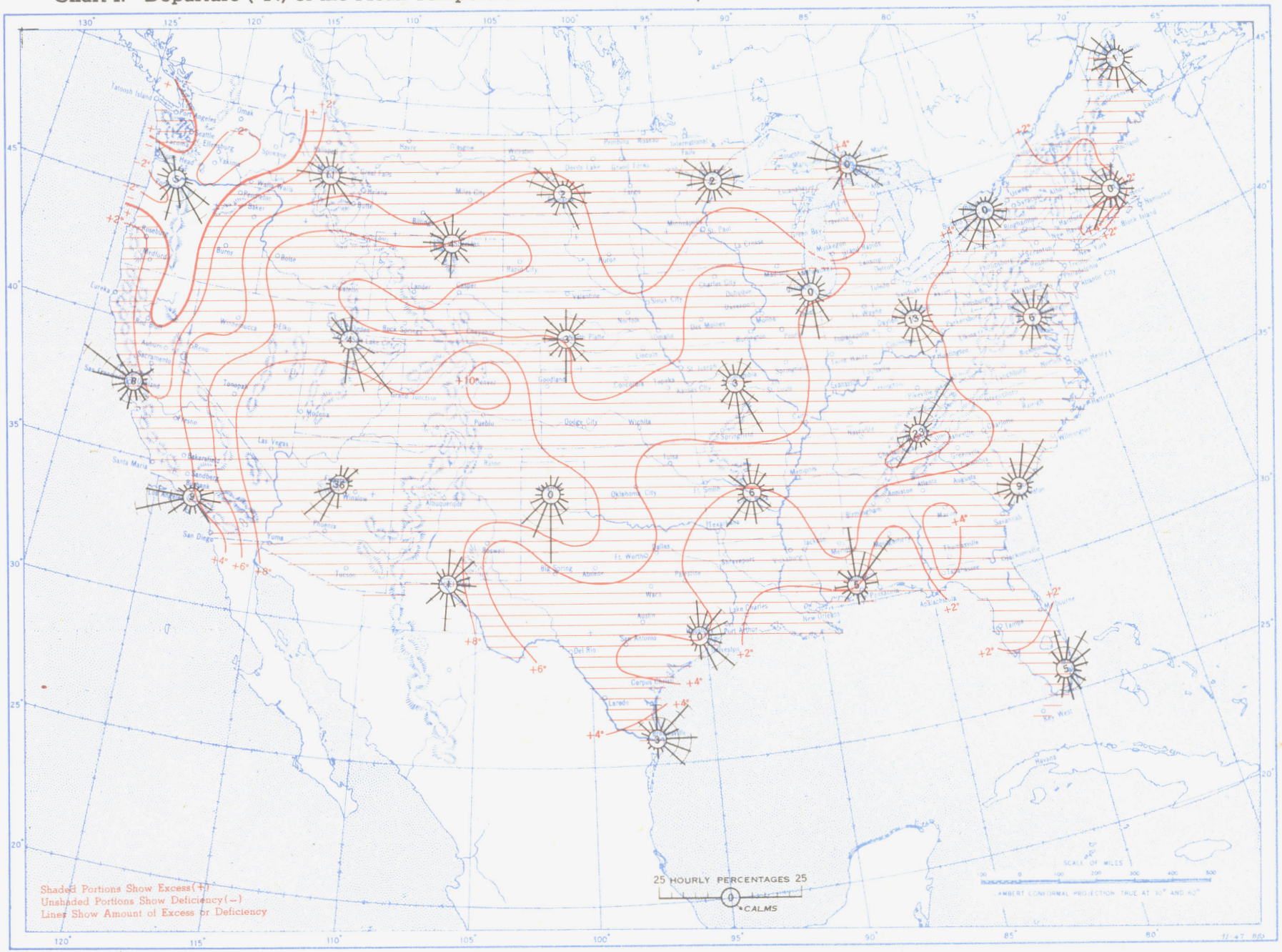
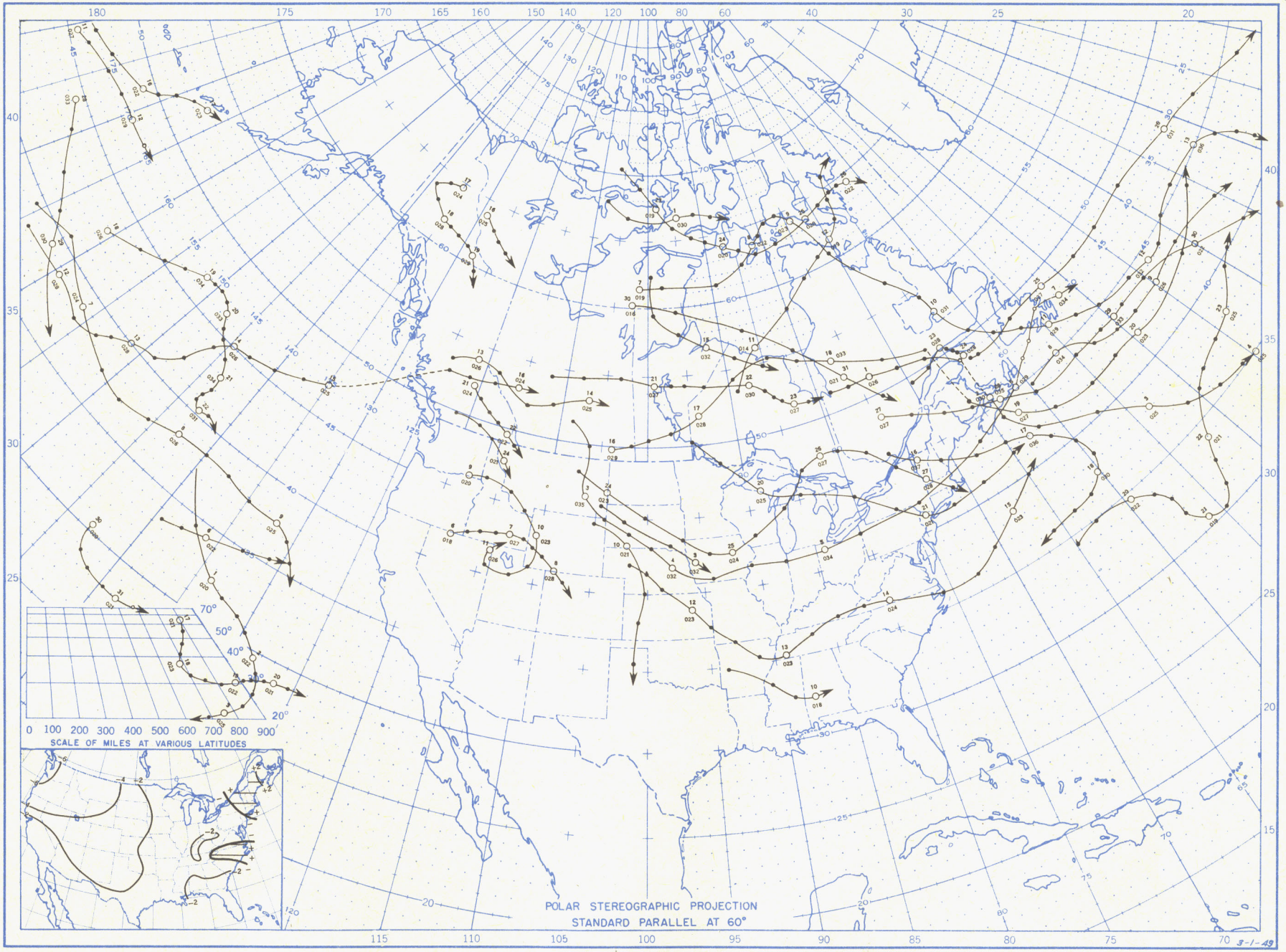
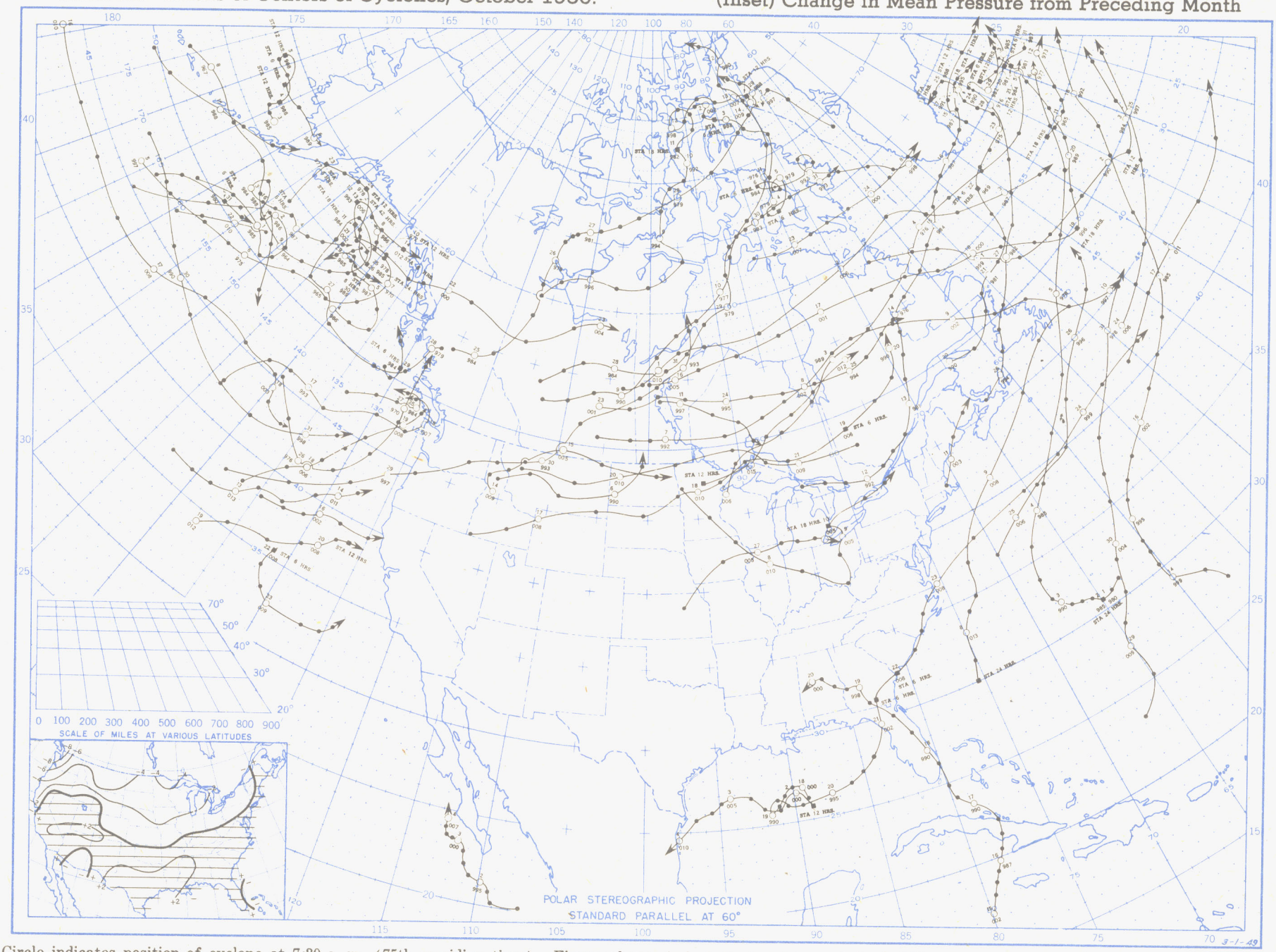


Chart II. Tracks of Centers of Anticyclones, October 1950. (Inset) Departure of Monthly Mean Pressure from Normal



Circle indicates position of anticyclone at 7:30 a. m. (75th meridian time). Figure above circle indicates date, and figure below, pressure to nearest millibar. Dots indicate intervening 6-hourly positions. Square indicates position of stationary center for period shown. Only those centers which could be identified for 24 hours or more are included.

Chart III. Tracks of Centers of Cyclones, October 1950. (Inset) Change in Mean Pressure from Preceding Month



Circle indicates position of cyclone at 7:30 a. m. (75th meridian time). Figure above circle indicates date, and figure below, pressure to nearest millibar. Dots indicate intervening 6-hourly positions. Square indicates position of stationary center for period shown. Only those centers which could be identified for 24 hours or more are included.

Chart IV. Percentage of Clear Sky Between Sunrise and Sunset, October 1950

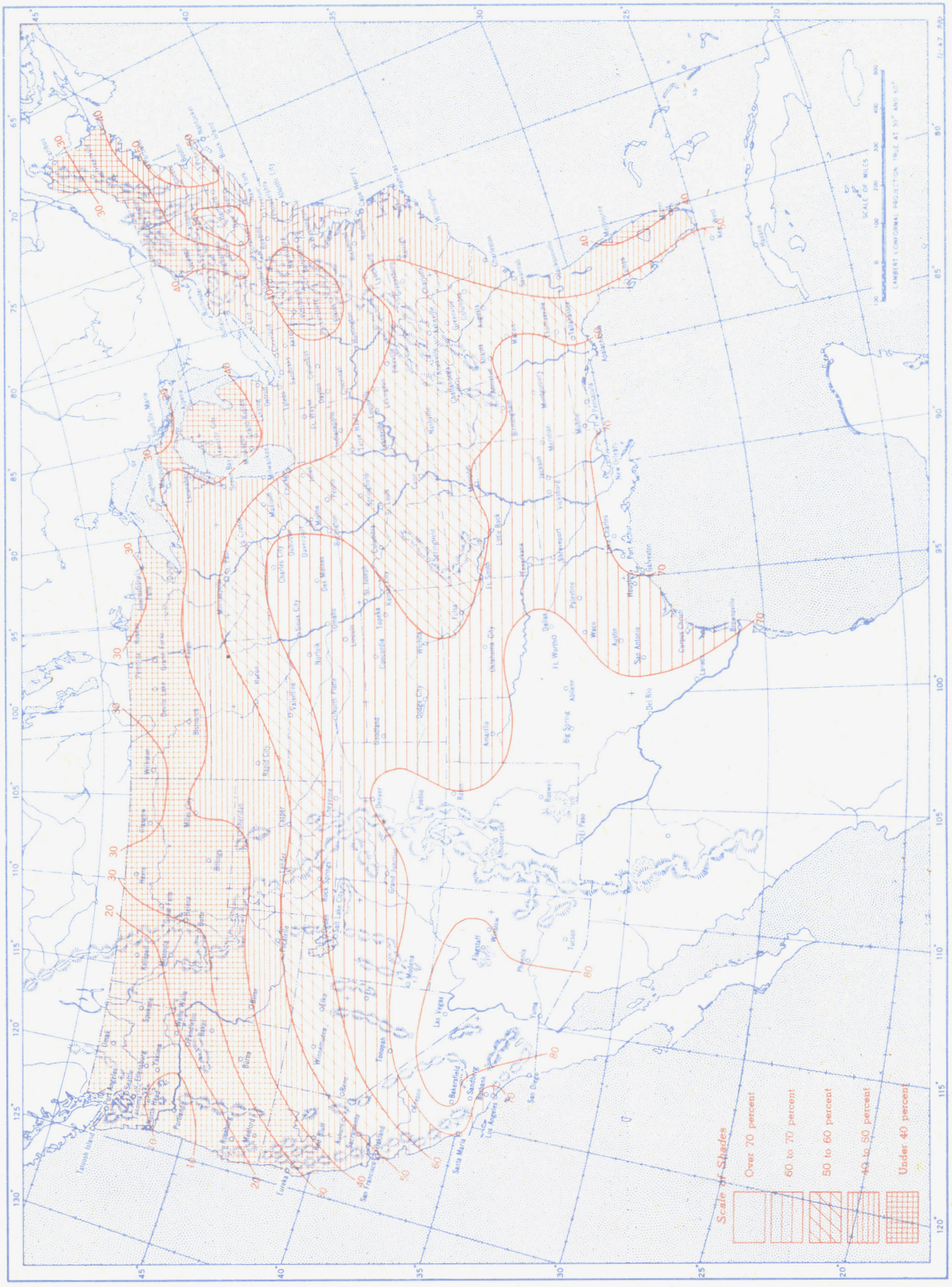


Chart V. Total Precipitation, Inches, October 1950. (Inset) Departure of Precipitation from Normal

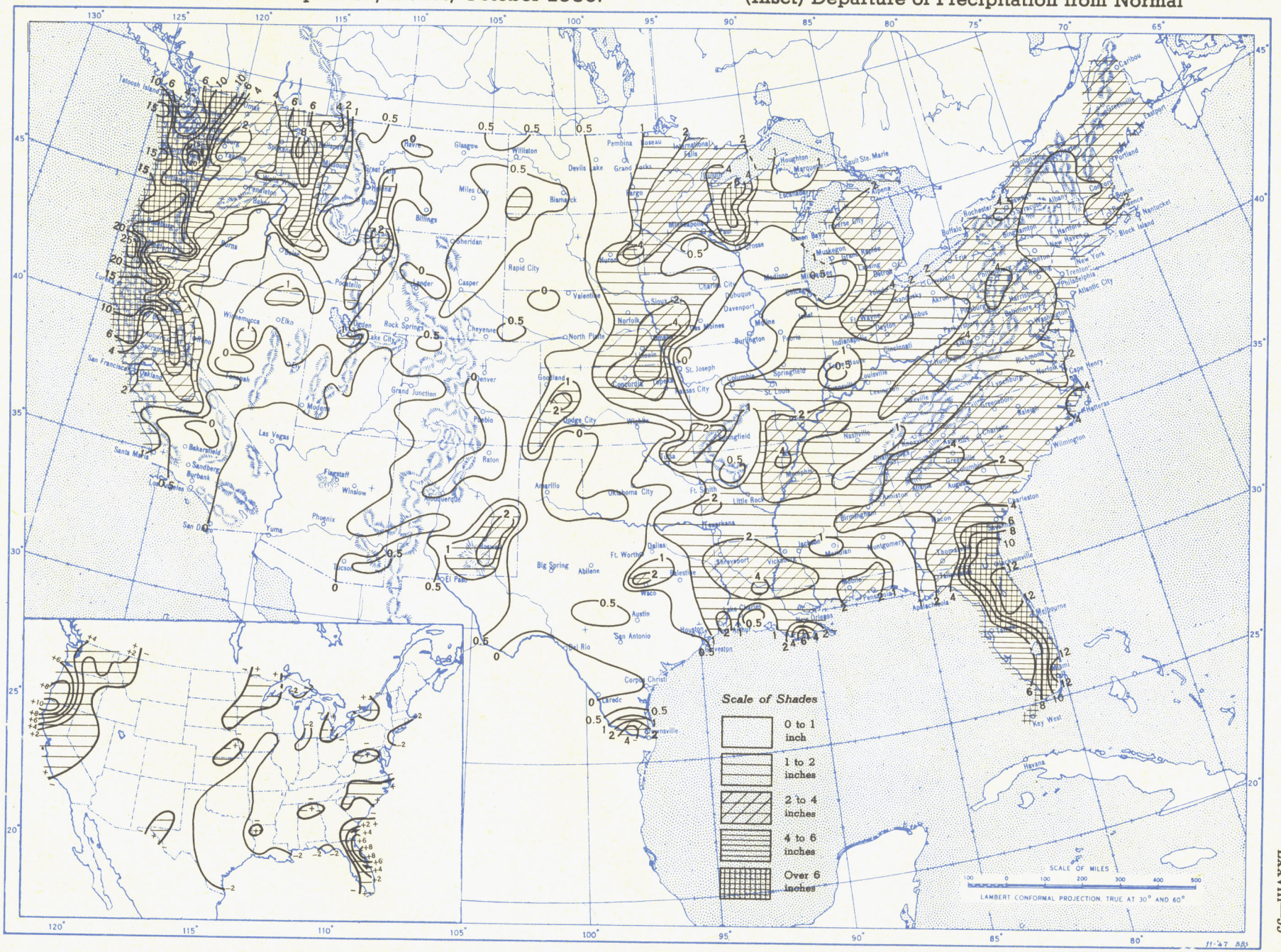


Chart VI. Mean Isobars (mb.) at Sea Level and Mean Isotherms (°F.) at Surface., October 1950

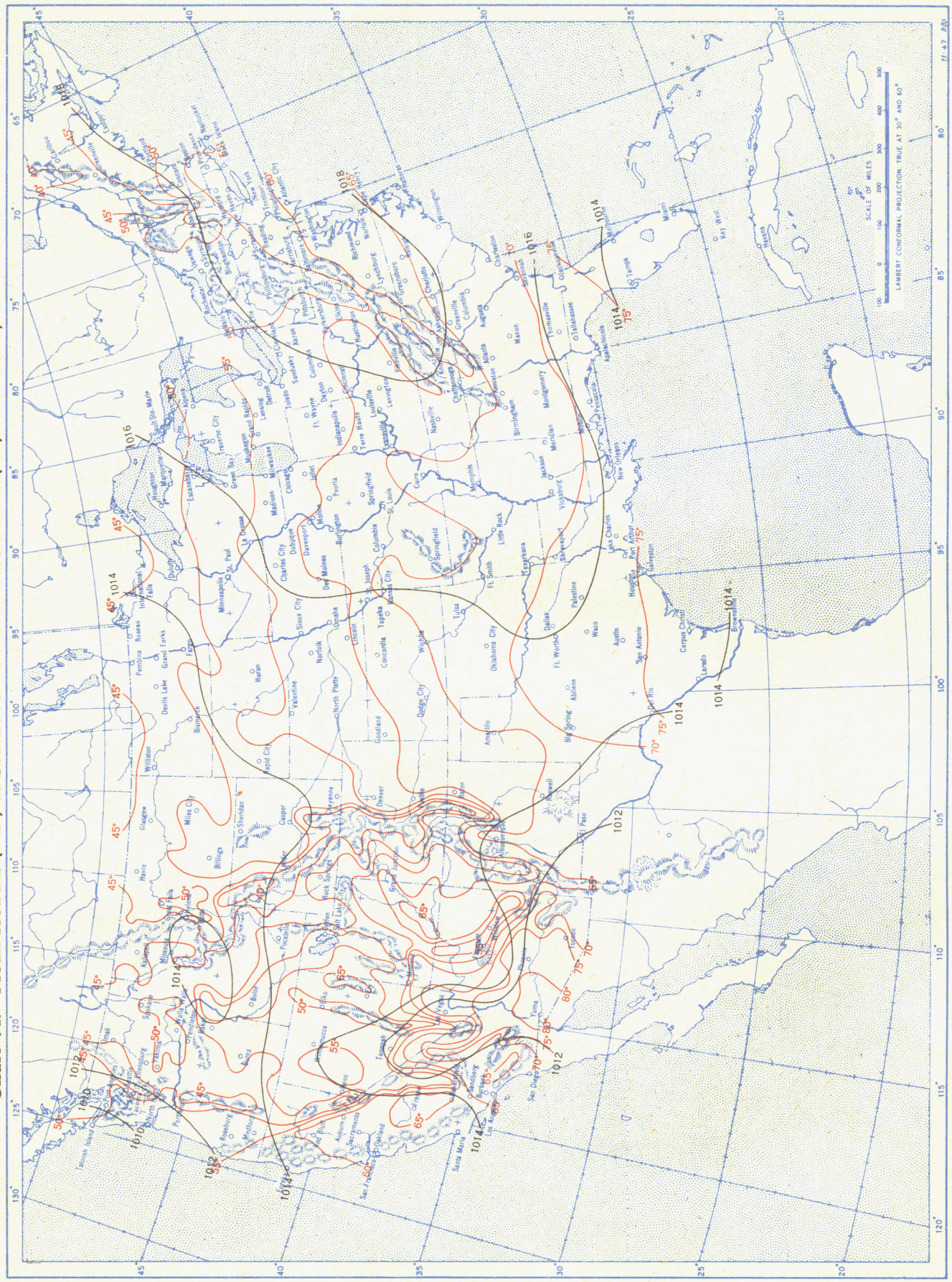
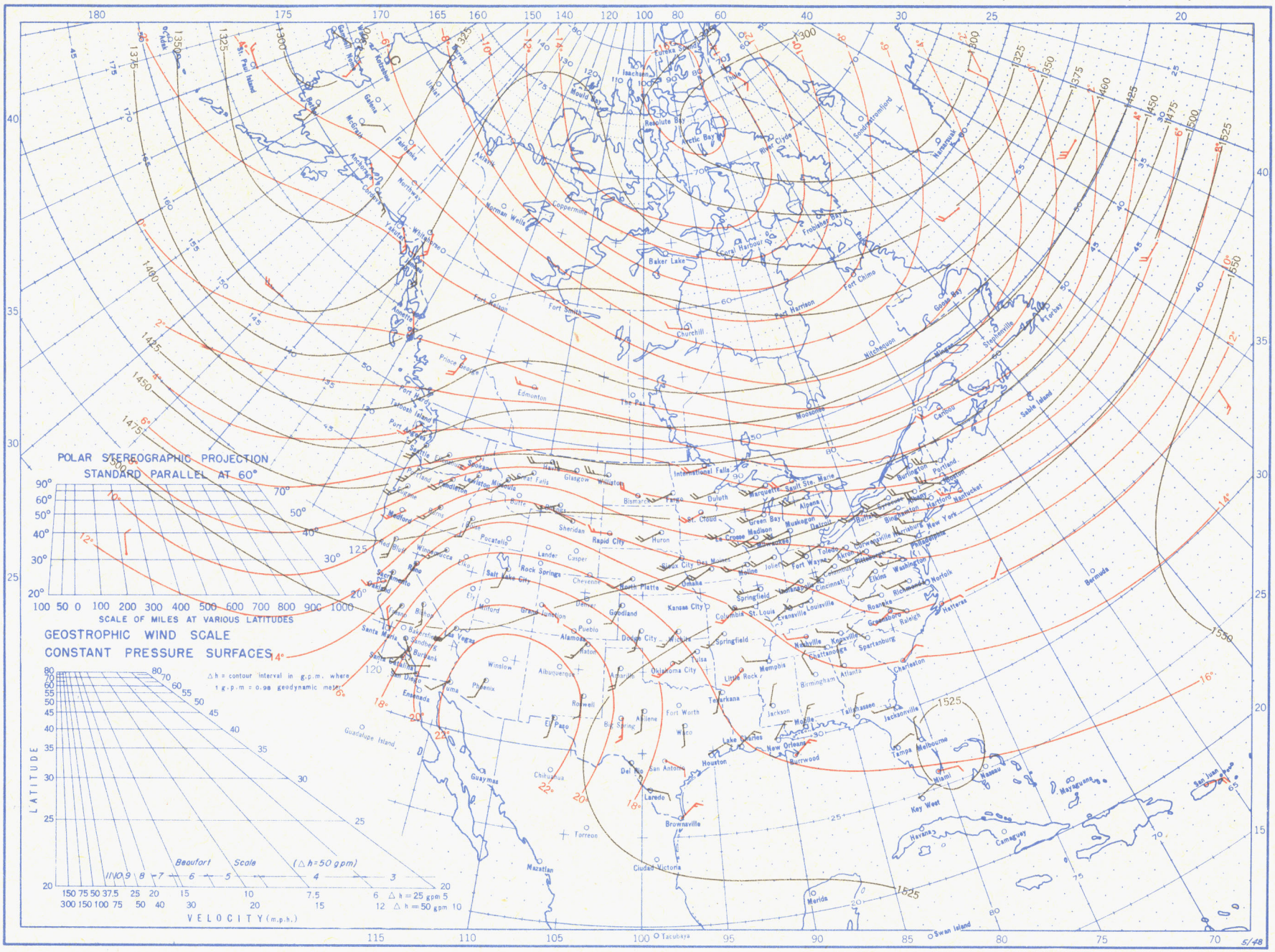
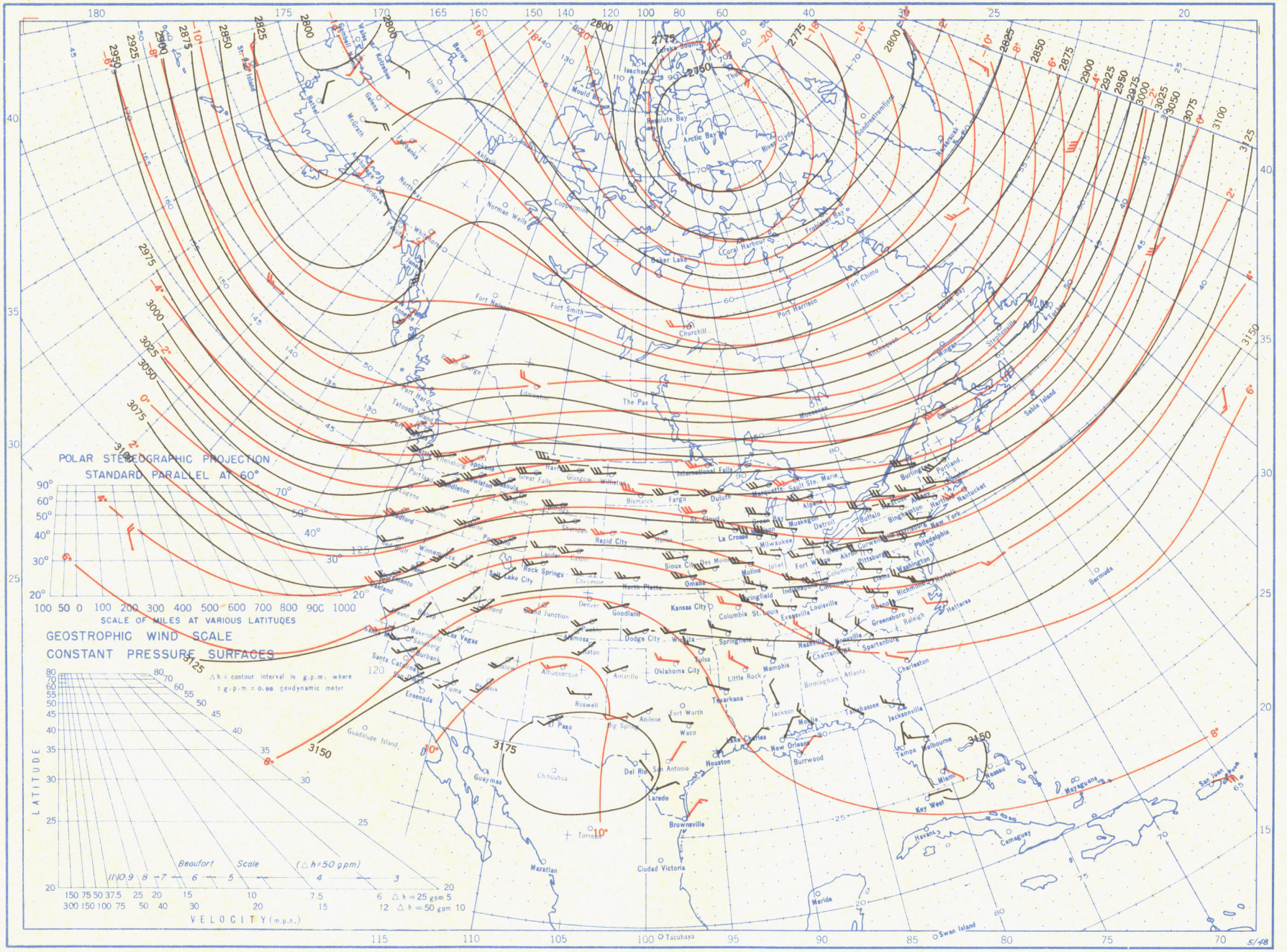


Chart VIII, October 1950. Contour Lines of Mean Dynamic Height (Geopotential) in Units of 0.98 Dynamic Meters and Mean Isotherms in Degrees Centigrade for the 850-millibar Pressure Surface, and Resultant Winds at 1,500 Meters (m. s. l.)



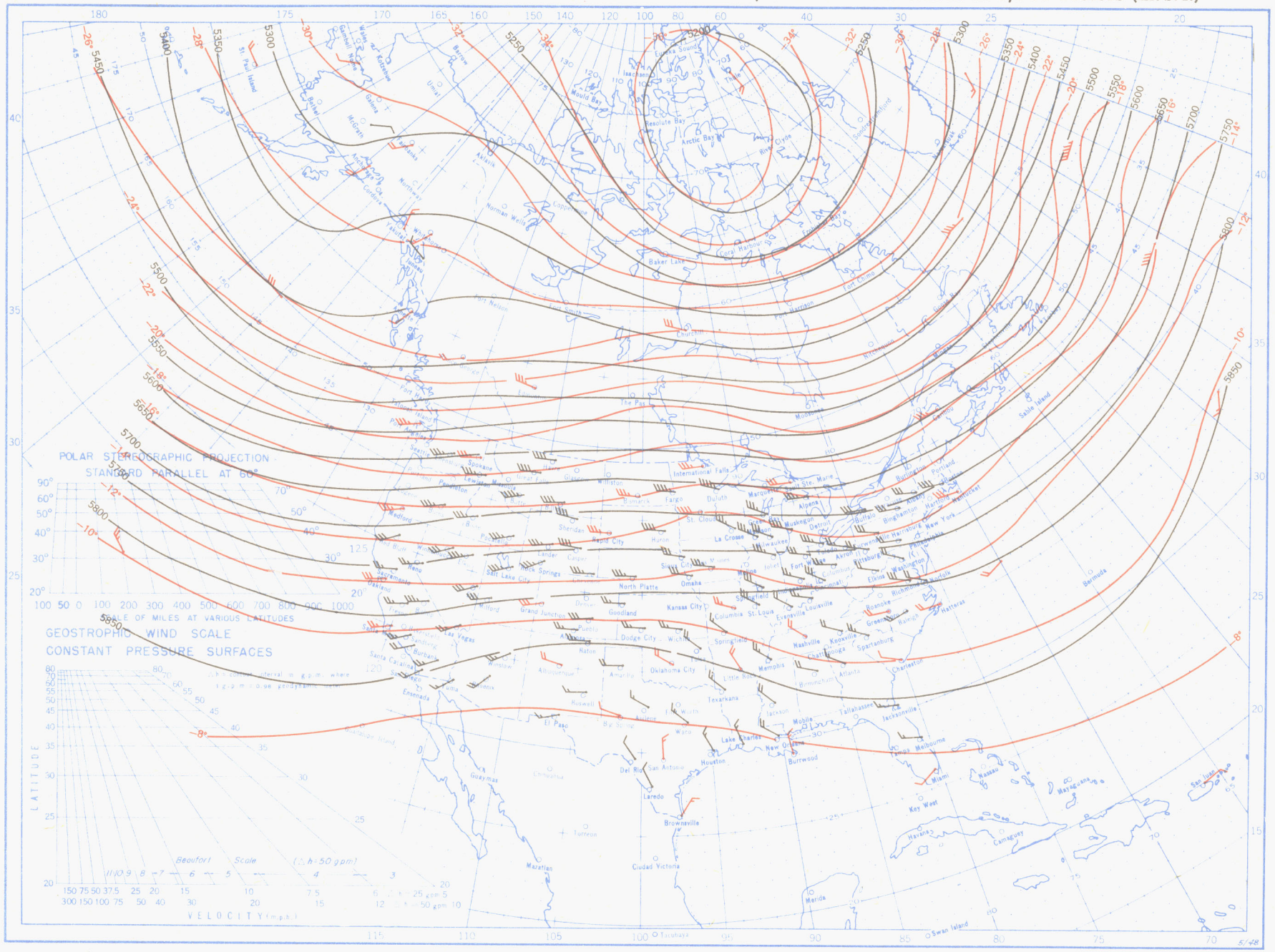
Contour lines and isotherms based on radiosonde observations at 0300 G. C. T. Winds indicated by black arrows based on pilot balloon observations at 2100 G. C. T.; those indicated by red arrows based on rawins taken at 0300 G. C. T.

Chart IX, October 1950. Contour Lines of Mean Dynamic Height (Geopotential) in Units of 0.98 Dynamic Meters and Mean Isotherms in Degrees Centigrade for the 700-millibar Pressure Surface, and Resultant Winds at 3,000 Meters (m. s. l.)



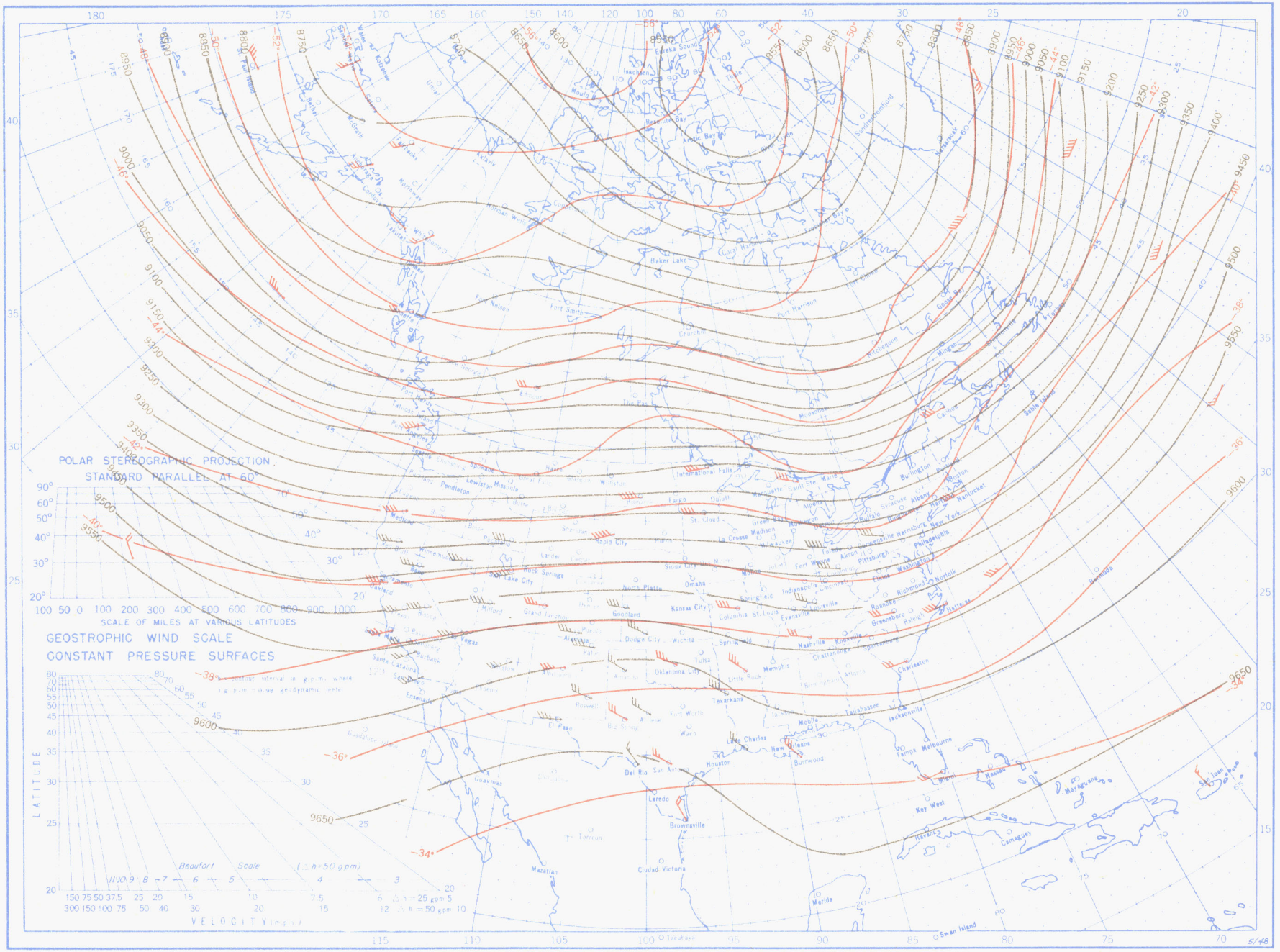
Contour lines and isotherms based on radiosonde observations at 0300 G. C. T. Winds indicated by black arrows based on pilot balloon observations at 2100 G. C. T.; those indicated by red arrows based on rawins taken at 0300 G. C. T.

Chart X, October 1950. Contour Lines of Mean Dynamic Height (Geopotential) in Units of 0.98 Dynamic Meters and Mean Isotherms in Degrees Centigrade for the 500-millibar Pressure Surface, and Resultant Winds at 5,000 Meters (m. s. l.)



Contour lines and isotherms based on radiosonde observations at 0300 G. C. T. Winds indicated by black arrows based on pilot balloon observations at 2100 G. C. T.; those indicated by red arrows based on rawins taken at 0300 G. C. T.

Chart XI, October 1950. Contour Lines of Mean Dynamic Height (Geopotential) in Units of 0.98 Dynamic Meters and Mean Isotherms in Degrees Centigrade for the 300-millibar Pressure Surface, and Resultant Winds at 10,000 Meters (m. s. l.)



Contour lines and isotherms based on radiosonde observations at 0300 G. C. T. Winds indicated by black arrows based on pilot balloon observations at 2100 G. C. T.; those indicated by red arrows based on rawins taken at 0300 G. C. T.